PROTECTION OF NON-HUMAN SPECIES AGAINST IONIZING RADIATION – CONCEPTUAL CHALLENGES AND POTENTIAL IMPLICATIONS FROM A GERMAN VIEWPOINT

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The protection of the living nature against ionizing radiation has rapidly developed in recent years. The aim is to close a conceptual gap in the hitherto existing radiation protection system centred on humans. The results of the EC funded project PROTECT (Protection of the Environment from Ionising Radiation in a Regulatory Context) support a generic Predicted No-Effect Dose Rate (PNEDR) of 10 µGy/h for chronic exposure situations, a numerical benchmark analogous to the Predicted No-Effect Concentrations of chemical pollutants. Conceptual challenges mainly arise from two facts. First, natural exposure might exceed the PNEDR, even in ecosystems virtually unaffected by man. Second, any risk based criterion should, from logical point of view, refer to the total exposure of fauna and flora, i.e. the sum of natural and anthropogenic contributions. Added risk approaches to define an acceptable anthropogenic exposure increment should explicitly take into account non-linear dose-effect relationships of population relevant endpoints. There is no scientific justification to apply the PNEDR only to the anthropogenic exposure increment in general.

We developed a graded approach that, one the one hand, closely follows human radiation protection and, on the other hand, is based on the established strategies and methods of conventional nature protection as far as possible and reasonable. If the total exposure of biota is below the PNEDR, ecosystems are considered to be adequately protected with a high degree of confidence according to the current scientific knowledge. If the total exposure is above this level, the acceptable increment arising from human activity should not exceed a pre-defined level (in the case of planned practices) or be the result of an optimization process (in the case of existing exposure situations). In emergency situations, countermeasures should primarily focus on human radiation protection. Potential implications of this approach will be discussed using hypothetical licensing procedures of nuclear facilities and installations in Germany as examples. With regard to the non-linear dose-effect relationships of population relevant endpoints, the major difficulty is to define an acceptable anthropogenic exposure increment.

This graded approach has been designed to resolve apparently conflicting requirements and to treat natural background in a logically consistent and coherent way. It implicitly includes the basic principle of conventional nature protection that an ecosystem virtually unaffected by man does not justify any protective measure, irrespective of the type and impact of a contaminant. Moreover, it communicates the positive message that approaches to environmental protection against chemical and radiological hazards are treated in a conceptually similar way.